

128,017

PATENT



SPECIFICATION

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*Complete Accepted, June 19, 1919.*

PROVISIONAL SPECIFICATION.

**Improvements in or relating to Fuel Injection Valves for Internal Combustion Engines.**

We, VICKERS LIMITED, of Vickers House, Broadway, Westminster, in the County of London, and Sir JAMES McKECHNIE, K.B.E., Director of Vickers Limited, aforesaid, of Naval Construction Works, Barrow-in-Furness, in the County of Lancaster, do hereby declare the nature of this invention to be as follows:—

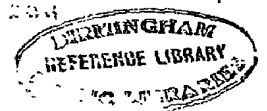
This invention relates to fuel injection valves for internal combustion engines and more especially to the type of valve employed for spraying liquid fuel under high pressure without the aid of an air compressor.

According to the present invention the valve is made with a short stem subjected to the pressure of the valve spring and is connected to the operating mechanism by means of a light tension rod. The valve itself is fitted in a spraying nozzle of suitable type and is preferably provided with a head lying at the bottom of the chamber of the valve body, within which is placed the valve spring, pressing upon the head through a washer, with a pressure which may be adjusted by means of a screwed plug in the body, the lower end of the tension rod terminating in an enlargement which engages detachably in a recess in the valve head.

The tension rod, which is preferably screwed at its upper end into a sleeve on which the valve lever acts, is normally free of spring pressure but for operation of the valve the rod is drawn upwardly to raise the valve from its seat against the pressure of the spring.

The ordinary liquid fuel injection valve comprises a long rod whose lower end acts as a valve and whose upper end is under the pressure of the heavily loaded valve spring, so that the central rod is under compression and has a tendency to bend, thus in some cases preventing the valve seating itself properly. This construction also involves very accurate workmanship throughout, whereas the present arrangement allows of such flexibility of the tension rod as permits the valve to accommodate itself to any inaccuracy of alignment that may be present. The accuracy of workmanship necessary is therefore confined to the comparatively short nozzle and valve. The nozzle is separate from the body of the valve and may be secured to the lower end of the body by means of a flange and external nut, the nozzle and valve forming a self-contained unit which may be removed from the body. The nozzle and valve can be ground together to ensure a proper seating before connection to the valve body and can be

[Price 6d.]



readily removed for examination without disturbing the spring. The valve tension rod can also be removed from the body without disturbing the spring, the washer of which then abuts against the shoulder formed by the lower end of the recess in the body, immediately above the valve.

Dated this 21st day of June, 1918.

HASELTINE, LAKE & Co.,

28, Southampton Buildings, London, England, and  
55, Liberty Street, New York City, U.S.A.,  
Agents for the Applicants.

### COMPLETE SPECIFICATION.

#### Improvements in or relating to Fuel Injection Valves for Internal Combustion Engines.

We, VICKERS LIMITED, of Vickers House, Broadway, Westminster, in the County of London, and Sir JAMES McKECHNIE, K.B.E., Director of Vickers Limited, aforesaid, of Naval Construction Works, Barrow-in-Furness, in the County of Lancaster, do hereby declare the nature of this invention and in what manner the same is to be performed; to be particularly described and ascertained in and by the following statement:

This invention relates to fuel injection valves for internal combustion engines and more especially to the type of valve employed for spraying liquid fuel under high pressure without the aid of an air compressor.

According to the present invention a valve having a short stem is provided (hereinafter termed a short stem valve) which is subjected at its upper end to the pressure of the valve spring, the short stem valve being attached by means of a detachable and flexible connection to a light tension or connecting rod which serves to connect the valve to its operating mechanism.

In order that the said invention may be clearly understood and readily carried into practice the same will now be described more fully with reference to the accompanying drawing which shows by way of example the preferred embodiment of the invention and in which:

Figure 1 is a cross sectional elevation of part of a cylinder cover with the short stem valve and the operating mechanism therefor in place therein.

Figure 2 is a detached view, partly in section of the short stem valve.

Figure 3 is a half section on the line A—B of Figure 2.

A is the cylinder cover and B is the valve body which is located within a recess *a* in the said cylinder cover. C is the fuel inlet which communicates with a tubular passage *b* in the valve body, and D is the valve lever which fulcrums at *d* on the upper part E of the valve body. F is the short stem valve which is fitted within a spraying nozzle G the latter being located within a chamber *b*<sup>1</sup> at the bottom of the passage *b* in the valve body. H is the aforesaid tension rod which is formed with an enlargement *h*<sup>1</sup> at its lower end which enlargement detachably engages within a recess *f* in the valve head *f*<sup>1</sup> the shape of which is more clearly shown at Figures 2 and 3. The tension rod H is detachably connected at its upper end to a sleeve I having a boss *i* on which one end of the valve lever D acts, the sleeve I being slidably mounted within a gland *i*<sup>1</sup> secured to the upper part E of the valve body. J is the valve spring which rests at its lower end upon a washer *k* which in turn normally bears upon the enlargement *f*<sup>1</sup> on the valve F. The pressure of the valve spring is regulated by means of a screw threaded plug *l* located within the tubular passage *b* and bearing upon the upper end of the valve spring J through the intermediary

of a washer  $l^1$ . The spraying nozzle  $G$  is detachably secured in position to the lower end of the valve body by means of a ridge or flange  $g$  which is engaged by a flanged nut  $M$  of the cross section shown, the upper internally screw threaded end of which engages the lower end  $l^3$  of the valve body. Owing to this arrangement the spraying nozzle  $G$  and the valve  $F$  can be removed from the valve body  $B$  without disturbing the valve operating mechanism. The nozzle and the valve thus form a self-contained unit and can be ground together to ensure proper seating before connection to the valve body. The tension rod  $H$  can also be removed from the valve body  $B$  without disturbing the valve spring  $J$  as the washer  $k$  when the tension rod  $H$  is removed abuts against the shoulder  $l^2$  which is formed by the lower end of the passage  $l$  in the valve body and the upper end of the valve chamber  $b^1$ . The tension rod  $H$  is normally free from spring pressure but for operation of the valve  $F$  the rod  $H$  is drawn upwards to raise the valve  $F$  from its seat against the pressure of the spring  $J$ .

The present arrangement allows of sufficient flexibility of the parts to permit the valve to accommodate itself to any inaccuracy of alignment that may be present. The accuracy of workmanship necessary is therefore confined to the comparatively short nozzle and valve and as the connection between the light tension rod and the short stem valve is of a flexible character, the instantaneous closing of the valve is not interfered with.

Having now particularly described and ascertained the nature of our said invention, and in what manner the same is to be performed, we declare that what we claim is:—

1. Fuel injection mechanism for an internal combustion engine, comprising a short stem valve which is subjected to the pressure of the valve spring and which is attached by means of a detachable and flexible connection to a light tension or connecting rod which serves to connect the valve to its operating mechanism.

2. Fuel injection mechanism for an internal combustion engine comprising a short stem valve which is detachably connected to the operating mechanism through the intermediary of a light tension or connecting rod, the valve being fitted within a spraying nozzle which in turn is detachably connected to the valve body, and the valve spring, the pressure of which may be adjusted by a screw plug, being adapted to press upon the head of the valve through the intermediary of a washer which, when the valve is detached from the tension or connecting rod, bears upon a shoulder at the upper end of the valve chamber for the purpose specified.

3. A short stem fuel injection valve constructed and arranged substantially as described with reference to Fig. 2 of the accompanying drawing for the purpose specified.

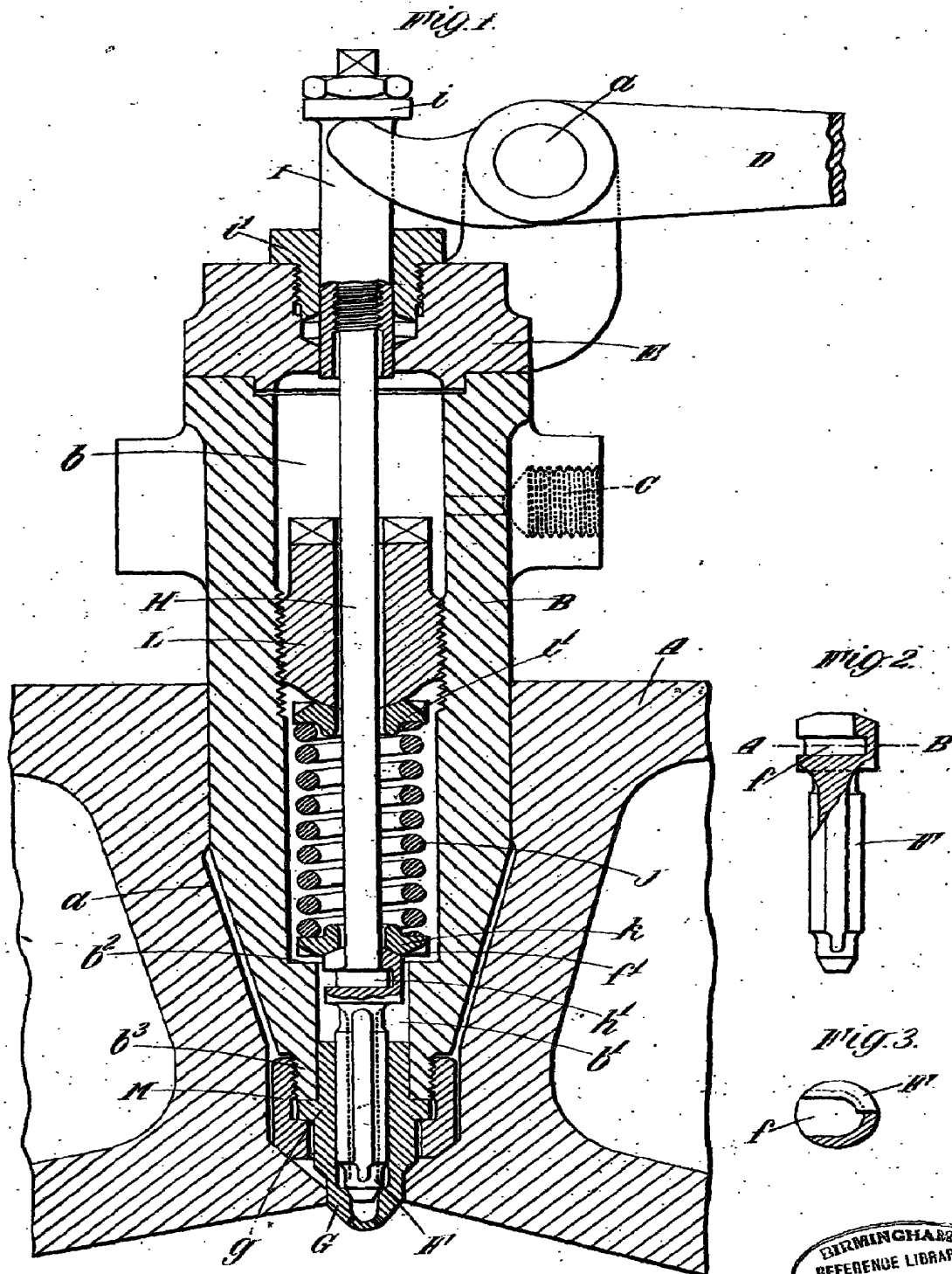
4. Fuel injection mechanism for an internal combustion engine having its parts constructed, arranged and adapted to operate substantially as described with reference to the accompanying drawing for the purpose specified.

Dated this 21st day of November, 1918.

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55, Liberty Street, New York City, U.S.A.,  
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[This Drawing is a reproduction of the Original on a reduced scale.]



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